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ABSTRACT

This paper presents an overview of research on academic tasks in the classroom and describes some of the themes that are emerging from studies in this area. The concept of "academic task" is defined along with problems associated with using this theoretical construct in classroom research. Three conceptions of how content should be represented to illustrate dimensions of the problems of curriculum in the classroom are summarized. How content is represented in teachers' definitions of academic work are explored. The meaning of these data for classroom research and understanding problems of professional practice in teaching and teacher education are discussed. A three page list of references concludes the report. (DF)

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Walter Doyle

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Content Representation in Teachers' Definitions of Academic Work

Walter Doyle

Over the past several years classroom researchers have shown increasing interest in the substance or content of teaching, that is , in what happens to the curriculum as lessons are accomplished (Erickson, 1982; Good, 1983; Shulman, 1984). One important theoretical breakthrough in this line of inquiry involves the use of the concept of "academic task" as an analytical tool for examining subject matter as a classroom process rather than simply as a context variable in studies of teaching (Doyle, 1983). It is now possible with this tool to examine more closely the curriculum as it is enacted in classrooms and to consider issues of instruction, management, and curriculum simultaneously in efforts to understand teaching and its effects.

The purpose of this paper is to give a general overview of research on academic tasks in classrooms and describe some of the themes that are emerging from studies in this area. The paper is organized around the notion of content representation, that is, the ways in which the curriculum is made concrete in the classroom tasks teachers define for students. This perspective is especially useful for showing how the curriculum can be studied as a classroom process and how curriculum is implicated in many of the propositions about management and instruction that are derived from classroom studies.

Although this paper is not intended as a formal research report, the comments about content representation grow out of the Managing Academic Tasks (MAT) study currently underway at the Research and Development Center for Teacher Education at the University of Texas at Austin (for details of design, method, and preliminary findings, see

Doyle, Sanford, Clements, French, & Emmer, 1983; Doyle, Sanford, Nespor, & French, 1984; Nespor, 1985a, 1985b; Sanford, 1985). Phase I of the MAT study consisted of an investigation of academic tasks in six junior high school science, mathematics, and English classes for a 6-week period in spring, 1983, and a special study in a team-taught English and social studies class in fall, 1983. Phase II of the study consisted of observations in two high school biology classes and one high school English class in fall, 1984. All of the teachers who participated in this project were nominated by district supervisors and principals as effective classroom managers who used a variety of assignments in their classes. Data obtained in this study consisted of daily narrative records of classroom events over extended periods of time (typically 4 to 6 weeks); copies of text material, worksheets, and handouts; copies of completed and graded student assignments; and interviews with teachers and selected students.

I will begin with a brief description of the concept of "academic task" and some of the problems associated with using this theoretical construct in classroom research. I will then summarize three conceptions of how content should be represented in order to illustrate dimensions of the problem of curriculum in classrooms and provide a context for interpreting data from the MAT study. Next, I will discuss in some detail ways in which content is represented in teachers' definitions of academic tasks. Finally, I will reflect on the meaning of these data for doing classroom research and for understanding the problems of professional practice in teaching and teacher education.

The Concept of Task

From the theoretical perspective represented in this paper (see Doyle, 1983), the curriculum exists in classrooms in the form of academic tasks that teachers assign for students to accomplish with subject matter. A task consists of:

1. A product, such as words in blanks on a worksheet, answers to a set of test questions, or an original essay;

2. Operations to produce the product, for example, copying words off a list, remembering words from previous instruction, applying a rule (such as "Plural nouns use plural verbs") to generate words, or making up "descriptive" or "creative" words;

3. Resources, such as directions to use notes from a previous lecture, consult a textbook, not talk to other students, or not use examples given in class;

4. The significance or "weight" of a task in the accountability system of a class (e.g., a grammar exercise might count as a daily grade, whereas an essay might count 15% of the grade for a 6-week term).

The concept of "task," in other words, calls attention to four key aspects of the school work students do in classrooms: a goal state or end product to be achieved, a problem space or a set of conditions and resources available to accomplish the task, the cognitive operations involved in assembling and using resources to reach the goal state, and the importance of the work to be done. These elements provide students with essential information about what they are to do with the content of the curriculum. From this perspective, tasks communicate what the curriculum is to students and, thus, shape their learning in fundamental ways.

Three comments are in order concerning this description of academic tasks. First, the same curriculum content can be represented by fundamentally different tasks. For example, writing may occur as a sentence-combining task in which students put short sentences together to form more complex sentences or as a composing task in which they must struggle to express their own thoughts and ideas. Thus, a list of topics that a teacher covers gives only minimal information about the actual curriculum in use in a class. Second, not all students necessarily accomplish tasks with the operations intended by the teacher or the curriculum designers. Some complete their work in ways that circumvent the learning of subject matter by, for example, copying work from someone else or guessing at answers. At a more serious level, some students misinterpret assignments or use inappropriate strategies and inaccurate information to get the work done. Finally, as Nespor (1985b) has recently emphasized, a task can be described at several levels. There is the task as the teacher has it in his or her mind, the task as the teacher announces it initially to students, the task as it is eventually negotiated in teacher-student interaction, and the task as each student comes to understand it in light of his or her background and interests and expectations. In this line of research, it is not unreasonable to wonder where's the task. At the same time, this complexity demonstrates the power of the framework to capture significant aspects of what goes on in classrooms.

How Content Should Be Represented

To provide a context for interpreting studies of academic tasks in classrooms, it is helpful to examine conceptions of how content should be represented to students. I will do this by first describing a

general framework for identifying types of academic tasks and then by discussing three recent papers that bring into focus questions related to content representation.

Types of Academic Tasks

Academic tasks can be differentiated in terms of the cognitive processes students use to accomplish assignments. For many tasks, the primary emphasis is on (a) memory or having students reproduce information they have already seen (e.g., spelling or vocabulary words); (b) formulas or having students apply a standardized procedure for generating answers (e.g., grammar rules or arithmetic algorithms); or (c) search and match or having students identify passages in a text that answer factual "study" questions.

Other tasks reflect an emphasis on what might be called "higher cognitive processes." At their core, tasks involving higher cognitive processes require students to make decisions about how to use knowledge and skills in particular circumstances (see Greeno, 1983; Heller, Reif, & Hungate, 1983). For example, students might be asked to recognize transformed versions of a formula they have already learned. At more advanced levels, students might have to (a) select an operation or combination of operations to solve a word problem in math, (b) draw inferences from given information to formulate new propositions, or (c) plan a goal structure for a complex writing assignment. The focus in tasks involving higher cognitive processes, then, is on comprehension, interpretation, flexible application of knowledge and skills, and assembly of information and resources from several different sources to generate a product.

Some Conceptions of Content Representation

This general framework can be given more concrete meaning by examining some specific notions about how content should be represented to students in classrooms. Let me point out that my intention here is not to criticize the research programs under consideration. The examples were selected, rather, primarily because they illustrate the issues and dilemmas in this area of inquiry. The emphasis on writing in these examples reflects the fact that a significant portion of my research on academic tasks has focused on this domain of the curriculum.

Theories of writing. The first example is taken from research by Marlene Scardamalia (1984) on contrasts between the theory of writing commonly held by elementary and secondary school students and the theory held by most expert writers. For many students, writing is a knowledge telling process. Thus, a report or essay consists primarily of listing all that one knows about a topic, starting usually with what is known best and continuing until there is nothing left to say. The most common problem in this kind of writing is knowing what to say next. Planning time is usually brief, and an outline is typically written in full sentences and serves as a blueprint for the final text. There is little structural difference between the outline and the final text, and most revisions consist of grammar and spelling corrections. Indeed, revision does not make a lot of sense to the knowledge teller unless he or she can think of more facts to add to the list.

For most expert writers, in contrast, writing is a knowledge transforming process. Here producing a text is akin to an "odyssey through memory stores." A large amount of time is spent planning before and during writing, and notes and outlines, which often consist of words

and phrases rather than sentences, serve as mental workspaces for an internal dialogue about the substance of the evolving text. During writing the author learns new things about the topic and struggles to achieve coherence. Revision is continuous, and ideas are rearranged to fit emerging conceptions of what the topic is. As a result, there is considerable structural difference between the initial outline and the final text.

It is hardly necessary to point out that these two theories of writing represent very different cognitive processes. Moreover, practice leading to masterful knowledge telling will not automatically lead to expertise in knowledge transforming. Scardamalia (1984) points out, however, that knowledge telling is an efficient strategy for accomplishing most school writing tasks (see also Applebee, Lehr, & Auten, 1981): The assignment can be produced in 10 minutes and will likely fit teachers' common evaluative emphasis on factual and mechanical accuracy. If one sees knowledge transforming as the ultimate goal of writing instruction in schools, then the problem of designing tasks to elicit knowledge transforming must be solved.

Occasions for writing. The second example is taken from a chapter on writing instruction by Susan Florio-Ruane and Sandra Dunn (in press). The paper, based on a larger research program on written literacy, was prepared largely for a practitioner audience, and the authors were quite explicit about how they think writing should be represented in classrooms.

Two central elements in Florio's work are "occasions for writing" and "student authorship." Descriptive research indicates that most occasions for writing in classrooms are initiated by the teacher who

also defines the topic and format of the writing and serves as sole audience and judge for the final product. Furthermore, instruction before students write tends to focus on isolated skills (e.g., grammar, punctuation, word choice, or sentence combining) and teachers' reactions tend to focus on product evaluation, which, in turn, is often limited to surface features of text and the accuracy of information. Under these conditions, students have very limited rights and duties of authorship.

Recent research on writing processes and writing instruction suggests, in contrast, that students learn to write when writing serves as a means of communicating something they want to say to an audience beyond the teacher or the classroom, and the teacher serves as a coach during the writing process rather than the final arbiter of the quality of the written product. Under such conditions, components of writing such as grammar, word choice, cohesion, and revision, are learned in the context of composing rather than as isolated skills. Through this process, students learn writing when they are given "the rights and duties of authorship" and technical support as they struggle with the processes of planning, revision, and editing.

In light of this research, the authors urge teachers to broaden the occasions for writing in schools by distancing themselves from the role of sole initiator, audience, and judge of students' writing and become coaches providing technical assistance and feedback during conferences with students as they go about writing a text. They argue that this shift will allow students to select their own purposes and audiences and thus make school writing more meaningful in their lives. As an occasion for writing that provides for student authorship, the authors describe a dialogue journal process in which the teacher and students communicate

with each other about topics of interest to the students. They also discuss computers as potentially valuable environments for creating meaningful occasions for writing.

This example underscores the conflict between the way content is commonly represented in classroom tasks and the way content should be represented if students are to acquire expertise. Occasions for writing commonly provided in classrooms do not afford students an opportunity to be authors because they short-circuit fundamental aspects of the writing process (e.g., decisions about topics, format, and audience). In other words, writing in classrooms is often not writing at all but rather exercises in form and isolated processes. Thus, one would expect few long-term consequences of writing instruction in schools. At the same time, Florio and her colleagues acknowledge that "writing is vulnerable" in classrooms because of managerial and resource constraints in these environments.

Theories of reading. The third and final example is drawn from some recent work by Judith Green, Judith Harker, and Joanne Golden (in press) on how meanings are constructed in lessons. This example has been reconstructed from a chapter focused on comparing the results of three different analytical approaches -- sociolinguistics and discourse analysis, semantic analysis and comprehension of text, and text analysis and reader response theory -- to the same data set.

The cases analyzed were two versions of the "same" lesson -- a story reading and discussion of The Way the Tiger Walked (Chacones, 1970) -- taught by two primary grade teachers to equivalent groups of six students selected from their own classes. These cases were chosen from a larger sample of 11 teachers who taught the same lesson. Data

consisted of a video tape and transcript of each lesson, a copy of the story, and transcripts of post-lesson retellings of the story by students. The last data set was scored for number of episodes and episodic elements accurately recalled and was used as an achievement measure in comparing the relative "effectiveness" of the teachers.

Although both teachers completed the same inservice program in comprehension instruction and questioning, there were substantial differences in outcomes and in the ways the lessons were taught. Teacher G's students had the highest ranking of the 11 groups on the story retelling task. Teacher S's students, on the other hand, ranked eighth among the 11 groups who were taught the lesson. At a process level, Teacher G conducted a two-phase lesson in which students were first introduced to the book (cover picture, title, title page, illustrator, and dedication) and then led through a reading-discussion of the story itself. A large majority of the teacher's questions and statements served to focus students on the content of the book. The lesson was goal-directed throughout and content coverage was high. Teacher S conducted a four-phase lesson in which students were first shown animal cut-outs and asked to tell all they knew about the animals. The teacher then entered a somewhat bumpy transition phase to shift students' attention to the story while they continued to make spontaneous comments about the animals. The third phase was the reading and discussion of the story, and the fourth was a more general discussion phase. During the third phase -- the actual reading and discussion of the story -- spontaneous comments about animals were frequent and the lesson was not tightly focused on the story itself.

Specific contrasts in talk between the two lessons are instructive. Teacher G had more new questions, rephrased questions, and total group questions than Teacher S. Teacher G also talked twice as much as students, whereas Teacher S had a nearly equal distribution of teacher and student talk. Teacher S also designated responders more frequently, permitted students to spontaneously initiate talk more often, had more clarifying cycles to determine what students meant, and repeated the same question to several students more often than Teacher G. Teacher S also had more control moves and more student bidding for turns than Teacher G. Finally, there is some indication that students in Teacher S's class did not take the lesson as seriously as students in Teacher G's class.

These contrasts suggest that Teacher G taught a teacher-led, group-focused lesson directed to the content of the story itself. Teacher S, in turn, taught a loosely structured lesson focusing on individual students and their personal knowledge about animals.

The important point for present purposes is that content was represented in quite different ways in these two lessons and these differences were reflected in what the teachers and students talked about in class, how they talked to each other, and what the students were able to recall about the story. Indeed, one might argue (although the case is not completely clear) that reading was depicted in Teacher G's class as a process of extracting and rehearsing information from a text and in Teacher S's class as a process of updating personal knowledge. The interesting thing about this argument is that, as one moves away from the details of the lessons to the underlying theory of reading reflected in these details, the issues of curriculum become more

problematic. One could easily build a case, for instance, that the theory of reading reflected in Teacher S's lesson is potentially more powerful for long-term consequences of reading instruction than that reflected in Teacher G's lesson. At the same time, a teacher following Teacher S's theory is not likely to obtain high recall of the details of a given story and the class is likely to be more difficult to manage because of the individualized focus and the diversity of relevant comments.

Parenthetically, one can also note that effectiveness is theory bound: An achievement measure, in this case recall of the text, reflects a theory of the content and thus defines the grounds for deciding effectiveness. In fact, there is some evidence in Green et al. (in press) that both teachers were effective in doing what they set out to do, that is, the students learned the content as represented.

This example illuminates again the point that the classroom tasks a teacher designs, often with managerial and pedagogical purposes in mind, have powerful effects on the way curriculum is represented to students. Moreover, the example raises questions about the congruence between conceptions of effective teaching (e.g., "Teacher-led, group-focused, goal-directed instruction is more effective") and theories of content (e.g., "Learning that reading is a way to update personal knowledge is likely to lead to better long-term reading habits"). Enacting some theories of content may not produce lessons that match the profile of a well ordered, smooth running class. Conducting well ordered lessons may not allow one to represent some forms of content to students. When issues of curriculum, instruction, and management are considered in

isolation, however, these interconnections are missed. I will return to this point in the concluding section of this paper.

How Content Is Represented in Classrooms

These three examples bring into focus the issues surrounding content representation and provide useful frameworks for interpreting patterns identified in the MAT study. I will now describe some of these patterns of content representation in the tasks teachers define for students in classrooms. This description of the way things are done in classrooms has been foreshadowed, of course, in the examples reviewed above. Nevertheless, the MAT study is generating some rich insights into how curriculum is enacted.

Curriculum as Work

An overriding impression one gets from studying academic tasks in classrooms is that the curriculum is represented to students as work. Students are given assignments to complete in specified periods of time, and rewards are distributed according to the quality of final products. Moreover, students are generally expected to be busy during class time, to appear to be working on their assignments. Indeed, much of the public conversation among teachers and students in classrooms focuses on specifications and standards for products and the credit different assignments carry in the overall evaluation system of a class. And teachers often construct elaborate economies of credit -- one of our MAT teachers called his system a "checkbook" -- that students earn for different types of academic work. In actual practice there is often a high degree of ambiguity in these credit economies, a point that will be discussed in more detail shortly. It is clear, however, that

accountability and credit are pervasive dimensions that determine the "value" of tasks in classrooms.

Let me illustrate the effect of work dimensions with the following example. I recently witnessed a marvelous demonstration lesson in science taught by a distinguished science educator. The students, who were equally distinguished educational researchers, were given cups, raisins, vinegar, and baking soda and asked to conduct experiments to discover why the raisins moved as they did in the solution. Involvement in the experiments was impressively high and the "students" appeared to be doing science, that is, formulating hypotheses, testing them, and drawing inferences on their own. The teacher skillfully coached the "students" as they engaged in these processes and never gave away the answer. In other words, help was available to do the experiments, but it was impossible to circumvent the task to get the answer directly from the teacher.

Viewed as science, this lesson seemed an admirable representation of an important aspect of the curriculum. But the demonstration was a one-shot experience isolated from a work system. In a classroom, students would typically want to know what happens next, that is, what will they be expected to know or do as a result of participating in this lesson. Will they be expected to remember what their raisins did, remember the scientific principles the experiment demonstrated, or be able to conduct another experiment with different materials? They might also want to know what grade, if any, they got for their participation in this lesson. If no grade was given or they all received the same grade and if the lesson was not directly connected to subsequent tasks, then students are likely to conclude that lessons of this type need not

be taken seriously. If differential grades were given, then students are likely to be distracted at least part of the time from the content to watch for ways of performing that are more valued by the teacher (see King, 1980).

This analysis suggests that the meaning of a lesson depends upon what kind of work it is. These effects are mediated, of course, by the previous experience students have with particular content areas and particular types of tasks as well as their general attitudes toward school work (Nespor, 1985b). Nevertheless, work dimensions shape the enacted curriculum in fundamental ways. I would argue, in fact, that the work perspective is essential if one is to understand the motivations and "sense making" of both teachers and students in classrooms.

Familiar vs. Novel Work

In most of our analyses, academic work can be divided into two broad categories: familiar and novel. Familiar work consists of routinized, recurring exercises -- spelling tests and grammar worksheets in English, warm ups and problem sets in mathematics, vocabulary lists and laboratory projects in science -- in which relatively standardized operations or algorithms are used to generate products. In some instances the work is quite difficult, involving fairly complex operations. But the work is predictable, that is, there is little ambiguity about what to do and how to do it and little risk that things will go wrong along the way (see Doyle, 1983). In many of the classes we have studied, such exercises accounted for one-half to two-thirds of the work students did for a term.

Novel work, on the other hand, consists of assignments for which students are required to assemble information and operations in ways that have not been laid out specifically in advance by the teacher. In other words, students are given responsibility for decisions about what to produce and how to produce it -- writing projects in English, word problems in mathematics, hypothesis generating and testing experiments in science. Florio's occasions for writing in which students assume the rights and duties of authorship would, for example, be novel work. Predictability is low for novel work, that is, there is more ambiguity about products and operations and greater risk of missing the mark. Moreover, cognitive demands for such work are high.

At an operational level there are several interesting differences in classroom processes and student performance when these two types of work are occurring in classrooms. When familiar work is begin done, the flow of classroom activity is typically quite smooth and well ordered. Tasks are initiated easily and quickly, work involvement and productivity are typically high, and most students are able to complete the work successfully. When novel work is being done, activity flow is slower and more bumpy. In comparison to familiar work, introductions to tasks are lengthy, and work involvement and productivity are sometimes low. When novel work is being done, in other words, the edges of classroom management are stretched, and the teacher's task becomes more complex. Moreover, rates for errors and noncompletion of work are high. In junior and senior high school English classes, for example, we have observed that students do considerably better on prewriting exercises in which they write topic sentences than they do in writing topic sentences for essays.

Three major responses to the pressure generated by novel work have been identified. The first response can be called anticipatory or preemptive management of the curriculum by eliminating most novel work from the class in favor of an efficient production system built on familiar academic work. This solution, which is fairly common in the classes we have observed, accommodates the management dimensions of tasks and achieves a well ordered class, but it truncates the curriculum.

The second solution involves manipulating accountability and credit within the work system. We typically find that grading criteria are more strictly and unambiguously applied to familiar work than to novel work. Indeed, familiar work is sometimes checked in class by students and grades announced publicly. At the same time, familiar tasks are typically smaller and more numerous so that a single product makes only a minor contribution to the final grade. Novel work, on the other hand, often has a single grade that counts heavily in the credit economy, for example, one-fourth of the term grade for a writing project. Most novel work is graded by the teacher, and grading criteria are applied more loosely and ambiguously than is the case with familiar work. It is often more difficult to get a low grade on novel work, and in some cases the lowest grade possible on a novel assignment is set at a C or B minus level. In addition, surplus credit often surrounds novel work and softens accountability. This is done in at least three ways. The first involves explicit bonus points, for example, 20 extra credit points for a good title for an essay. It is often difficult to trace bonus points through the credit economy to the final grade, suggesting that they function largely as immediate inducements to work on novel assignments.

The second way of creating surplus credit is to afford provisional tries, that is, allow students to hand in work for a preliminary grading and then redo it for a final grade. In some instances the difference between provision and final products is quite dramatic. Finally, teachers create surplus credit by explicitly balancing familiar and novel work. This is done, for example, by telling students to work diligently on spelling to offset potentially lower grades on essays or by giving exercises on writing skills as part of the setting up of a writing assignment to bolster final grades. In most balance situations it is clear that final grades for a term are heavily weighted for familiar work that can be readily accomplished by most of the students. Moreover, students respond in class more actively to familiar work than to novel work, and they perform more successfully on familiar tasks than on novel tasks even when the content (e.g., writing topic sentences) is the same.

Ambiguity and surplus credit occur in part because all grades have to be reduced to a single grade at the end of a term. Along the way, some grades are lost or their effects are washed out. At the same time, these features of the credit economy in a class enable a teacher to rapidly adjust the effects of risk on particular tasks, especially those for which performance is likely to be poor, without abandoning accountability altogether. More needs to be known, however, about the consequences of credit manipulations on students' perceptions of the meaning and seriousness of academic work.

The third solution to problems associated with novel work in classrooms involves the <u>familiarization of content</u>. By breaking work down into smaller components and repeatedly exposing students to these

segments, teachers increase the familiarity of the task environments. That is, they make novel work familiar. In the process, nominally difficult work is made easier, but the degree of student responsibility and decision making is narrowed. An example will clarify how this is done. One junior high school English teacher in the MAT study gave what appeared on the surface to be a fairly complicated test on personal pronouns. The test required that students be able to (a) recognize personal pronouns in a paragraph; (b) select a proper form of "its" or "it's" to complete sentences; (c) choose the correct form of personal pronouns to fill blanks in sentences; (d) write sentences with personal pronouns defined by their position on a pronoun chart; and (e) fill in all the blanks on a pronoun chart defined by person, number, and case. The demand for a considerable mastery of pronouns was softened, however, by the high congruence between the exercises students completed prior to the test and the sections of the test itself. In other words, the students had considerable practice identifying pronouns in paragraphs, distinguishing "its" from "it's" to complete sentences, selecting pronoun forms to fill blanks in sentences, and putting pronouns into cells on the pronoun chart. Although the exact items from exercises were not repeated on the test, the similarity across occasions in which students worked with pronouns is likely to have made the test environment quite familiar so that recall and application were simplified considerably.

If one accepts the view reflected in Scardamalia's and Florio's papers that learning to be an expert requires that students make real-life interpretations and decisions, then familiarization of novel work is a cause for concern because it truncates the curriculum. This

is not an uncontroversial position, however. Instructional designers have for years argued that breaking curriculum tasks down into smaller segments and teaching these sequentially will improve student performance (see Rosenshine, 1983). And certainly in the classes we have observed familiarization appears to function as a way of insuring that students can do the more complex tasks. But the prompting is heavy and the focus seems to be on keeping the activity moving smoothly and getting a correct product rather than teaching a process (see Bennett, Desforges, Cockburn, & Wilkinson, 1984). I often wonder whether familiarization makes all learning algorithmic and episodically coded to school settings and, thus, fails to enable students to use their school learning flexibly. To explore this issue further, I now turn to a brief consideration of the complex problem of meaning in academic work.

Skills, Processes, and Meaning in Academic Work

In many hours of classroom observation, I have seldom seen students accomplish tasks in which they are required to struggle with meaning. Of course, they often struggle with the meaning of work: what are they supposed to do, when do they have to finish, what is the answer to the fifth item, etc. But meaning is seldom at the heart of the academic tasks they work on. Grammar usually consists of selecting one of two words in parentheses that seems to sound right rather than an effort to express a thought accurately and clearly. Literature often involves memorizing the facts of a story, expressing an opinion, or learning the standard interpretation of a passage rather than groping to understand what the story or poem means. And writing frequently requires following a format to construct a text that has a specified number of adverbs and transition words rather than an occasion to communicate an idea.

Recently I have become intrigued with this problem for two reasons. First, most normative models of curriculum are constructed around understanding or meaning. Second, there is evidence that students are often proficient at computations and procedures but fail to understand what they are doing (see Davis, 1983; Eaton, Anderson, & Smith, 1984). To pursue this interest here I will examine two classroom curriculums that are apparent in our data and conclude with a brief attempt to explore what form a classroom curriculum directed toward meaning might take.

A skills curriculum. In many of the junior high classes we have studied there appears to be a skills-based curriculum. In such a curriculum, emphasis is on drill and practice of discrete skills which are part of a larger domain such as mathematics or grammar. In its classroom form, this curriculum has the following properties. First, the curriculum consists of a fairly large number of small tasks handled in a routinized, recurring manner. That is, most of the work is familiar work. Second, work involvement and productivity are typically high. Students complete a large number of tasks, and the groups are orderly. Third, there is little differential weighting of credit for different tasks. All tasks are equal, and final term grades are calculated by averaging grades on individual tasks. Fourth, tasks are interchangeable. That is, while there may be a broad sequence (e.g., addition before multiplication or fractions before decimals), the ordering of tasks for a day or even a week is somewhat arbitrary. Decisions about order for practicing skills are based on management considerations, personal preferences, or need rather than a logical or semantic thread that ties the separate tasks together.

One of the junior high school math classes in our MAT study exemplified a skills curriculum. During the observation period of 6 weeks, students completed a large number of tasks providing practice on each new skill or concept. In addition, they had daily assignments designed to reinforce and evaluate skills taught earlier in the year. The teacher used four main types of tasks: application tasks (warm-up problems requiring different skills), reinforcement tasks (guided practice on new skills), review tasks (covering a skill learned earlier in the year), and assessment tasks (tests in which students demonstrated attainment and retention of skills). Several interrelated content strands involving operations with whole numbers, fractions, and decimals operated simultaneously and were encountered on a variable schedule. These strands constituted the "old" content covered previously. "New" content involving the conversion of fractions to decimals, decimals to fractions, and the introduction of percent were worked into the curriculum in small segments and practiced along side the old content. However, students were held accountable during the observation term only for mastery of the old content. In sum, the math curriculum in this class appeared as a set of somewhat discrete skills that needed to be practiced and mastered independently, and the emphasis was on computation rather than math concepts.

In one junior high school science class in the MAT study, the skills curriculum appears to have been misapplied. The teacher covered circulation and digestion. These topics, commonly covered in junior high science, contain a great deal of factual information and technical terms as well as complex biological processes, and the sheer amount of information would make this a difficult area to deal with under any

circumstances. The emphasis in this class was on discrete pieces of the content rather than integrative conceptions, and the tasks were only loosely tied together. Engagement was high and students did a lot of work--labs, worksheets, textbook reading, and so on--but content development across the term did not seem to follow a clear logical progression. Tasks were interchangeable and scheduled on what appeared to be management rather than substantive considerations. It was not clear that any overall meaning or semantic thread was built into the system. Interestingly, there is not evidence that students were bothered by the apparent lack of content progression or integration in this class. There was a logic to the work system, that is, tasks were predictable and easy to accomplish, and the students seemed to be satisfied with this arrangement.

There is some evidence in our work and that of other investigators (see Anderson, 1983; Davis, 1983; Eaton et al., 1984) that content in a skills-based curriculum can easily become proceduralized. Students learn computational algorithms or follow procedures for carrying out experiments with plants or light but fail to understand the mathematical or scientific principles that underlie the exercises and often retain or form misconceptions of these principles. They can tell you how to get an answer to a problem but not what the problem means. And the studies indicate that this pattern is not limited to elementary and secondary schools. It persists in college classes. Furthermore, the recent attempts to teach the processes that experts use as isolated skills is likely to lead to the same kind of proceduralization unless attention is given to the decisions involved in applying these skills flexibly to novel situations.

Processes and meaning in curriculum. I have recently begun to notice a second way in which curriculum can become proceduralized and meaning excluded from academic work. This proceduralization appears to be especially prominent in the teaching of writing as a process of producing texts with certain specified features such as topic sentences, supporting arguments, and transition words. I will discuss an example from our data to bring this issue into focus.

The example comes from a team-taught junior high school combined English and social studies class for high-achieving students. Observations focused primarily on a 4-week unit on the Indians of the region. The unit consisted of several student projects from map drawing to collages to writing. The students were to do independent readings on tribes of their own choosing and reflect this information in their products. The writing assignments included two descriptive paragraphs and an analytical paragraph (comparison and contrast or cause and effect). The teachers described these assignments in class in terms of both their substance and their form. Substantively, students were to learn about a tribe or tribes and use this information to describe some aspect of their life, compare and contrast two tribes, or show how some factor such as environment had an effect on their life. The format of the paragraphs were described in terms of their elements: topic sentences, descriptive terms, supporting arguments, clincher sentences. In addition, the teachers presented a fictitious tribe to model how information could be assembled to construct paragraphs.

One student who was interviewed adopted a procedural interpretation of the writing assignments. He saw the work as essentially a process of turning notes into paragraphs and he was confident that he could do

this. He also used a search-and-match strategy in which he looked for existing texts that seemed to match what the teachers had in mind for the assigned products. At the same time, his interpretation excluded substance. He had little interest in or knowledge about Indians and did not appear to think that gaining such knowledge would be helpful. Rather, he was to find a text that was close to the teachers' specifications and then finish out the product. This student saw the teachers' example of the fictitious tribe as a very useful illustration of the procedures he was to follow to turn notes into paragraphs. In contrast, another student who adopted a more substantive orientation to the unit saw little relevance for the fictitious tribe example because it did not contain information about a real Indian tribe that she could use in writing her paragraphs.

The weaknesses of a procedural interpretation of the work became apparent in the final products. The student was unable to write topic sentences or order his arguments well without knowledge about Indians. He even failed to select a text that adequately matched the teachers' specifications for the assignments. The student, however, had difficulty understanding why his performance was unacceptable because he thought he did what he was supposed to do.

Although a procedural interpretation of the writing assignments was narrow and did not accurately reflect all that the teachers' said about the assignments, there were some grounds for this approach. The writing assignments were discussed in terms of their formats and elements and an example of a fictitious tribe was presented for which substance was irrelevant. Moreover, the class did not discuss and was not held accountable for a common body of knowledge about Indians, a factor which

also pushed substance into the background. The point here is that some of what the teachers did in class could have led to a procedural interpretation of the curriculum.

There are other cases in our data in which writing assignments are constructed around formats such as descriptive or persuasive essays that contain elements such as topic sentences, supporting points or arguments, and certain kinds of emotive or functional words. In many instances, students have difficulty writing these forms. They attempt to build persuasive essays around statements of fact rather than arguments for a particular position or viewpoint. They insert transition words at random rather than use them to show particular connections between ideas. Without meaning, the form is difficult to follow. And, as Florio suggests, it is reasonable to wonder what a process approach to writing actually teaches and to question whether it is possible to teach forms and elements of writing when students have nothing to write about.

At the same time, an emphasis on format enables a teacher to cover different types of writing, many of which the students will be expected to produce in school settings, and to identify clearly dimensions to focus on during evaluation. Moreover, it is difficult to imagine that much writing instruction would occur at all if a teacher waited for students to initiate school writing occasions.

A classroom curriculum for meaning. The analysis to this point clearly suggests that meaning is vulnerable in classrooms. My own view is that this vulnerability is real and problematic. I continue to be impressed by the extent to which classroom factors push the curriculum around, and I doubt that these factors can be easily manipulated or

blunted, even by computers. The press in classrooms is strong. The studies considered here suggest that certain types of tasks are suitable for classrooms, that is, they fit the constraints of teacher and student work systems in these environments, and these tasks tend to represent the curriculum as discrete skills and procedures rather than as occasions for struggling with meaning. In turn, when one starts with an occasion in which students are struggling with meaning and taking responsibility for "authorship" and tries to put it into a classroom, it is likely be transformed fundamentally. I am inclined to conclude that meaning will remain vulnerable in the classroom curriculum.

From this perspective, the search for a classroom curriculum for meaning is clearly problematic. I have little sympathy for the argument that we can completely dismantle the present classroom system and avoid its problems by starting over. Faced with educating 600 or more students at a time with limited resources and a need to tell parents and other citizens how well it is going, we are likely to come up against the same forms and tensions. Yet, I am growing more optimistic that peeling back the layers of understanding is a way to bring classrooms under the control of technical expertise.

There is some indication in our data that a classroom curriculum for meaning will not score well on such dimensions as goal-directedness, coverage, or productivity. A case of a junior high school science class is especially instructive in this regard. During a 6-week grading period the teacher in this class emphasized problem-solving and reasoning skills in units on the metric system and laboratory measurement and on scientific research methods. The students completed only 14 tasks (low for the sample of teachers we have observed), and 80%

of total class time was devoted to only 6 tasks. Moreover, engagement was not always high, productivity was sometimes low, and work was not always conducted efficiently. Yet, the logical progression or semantic thread of content was quite explicit and clear, and students were pushed to deal with some fundamental issues in science. And many novel tasks were used in which students were required to discern relationships, assemble information, and solve problems. It is interesting to note, however, that even in this setting only about one-half of the students chose to do optional assignments for higher grades. Indeed, one of the most capable and regularly high scoring students in the class accepted a C on her report card rather than complete an optional activity.

These random thoughts suggest that learning how to construct and enact a classroom curriculum for meaning is a fundamental problem in research on teaching, and one that we are only beginning to understand how to formulate. I suspect that it will eventually drive much of the inquiry in classroom research. Research along these lines will also be important for teacher education. Many teachers, even many of those considered to be quite effective, are not likely to have a rich semantic grasp of their content. This situation is not surprising as most content domains are not taught that way, even in college classrooms (see Davis, 1983). Furthermore, little of the content of standard teacher education programs is directed to the issue of how teachers might design academic tasks to represent the curriculum adequately to students. As we learn more about creating classroom curricula, we will be able to enrich the opportunities teachers have to learn content and represent it to students in classroom tasks.

Conclusion

This analysis of content representations in teachers' definitions of academic work underscores especially the point that enactment transforms the curriculum and that this transformation has important implications for what students learn in classrooms. This conclusion suggests that fundamental issues in teaching require that we look at management, instruction, and curriculum simultaneously. If we do not, then it is likely that we will continue to find that management drives the curriculum in classrooms and continue to design academic tasks that cannot be managed in classroom settings. Moreover, when we consider management or instruction or curriculum in isolation, it is possible that our prescriptions for effective practice in one area will have unintended consequences for other domains. Finally, if we are ever to solve the very real problems of meaning in academic work, then we must account better for the range of the dimensions that shape classroom systems.

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